

## Comparison of Disease Development in Beans in Pure Stand and Maize Intercrop.

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Diseases are a major problem in beans (*Phaseolus vulgaris*) and are often considered as the key factor limiting production in Uganda. The major diseases include common bacterial blight (*Xanthomonas compestris* pv. *phaseoli*), rust (*Uromyces appendiculatus*), anthracnose (*Colletotrichum lindemuthianum*), angular leaf spot (*Phaeoisariopsis griseola*) and in the high altitudes also Phoma blight (*Phoma exigua* var. *diversipora*) and halo blight (*Pseudomonas syringae* pv. *phaseolicola*) are important. In Uganda the bulk of beans are produced by small scale farmers who commonly practice intercropping (Osiru 1980). The breeding trials however, which include disease screening are conducted in pure stand. Several reports in literature indicate that the incidence of particular pathogens and disease severity can alter with a change in cropping system (Miguel, 1986; Moreno, 1979). This study was therefore initiated to investigate the reliability of continuing to select in pure stand for genotypes later to be recommended for growing in intercrop under the conditions in Uganda. The bean-maize intercrop being the most common in Uganda was used in this study.

### Materials and Methods

Fourteen local land races and eleven introduced genotypes were evaluated for disease reaction at Bukalasa (altitude 1300 m) in the first and second season 1988 in a split plot experiment with three replicates. Two cropping systems (pure stand versus intercrop) were the main plots and the genotypes the subplots. Each bean plot comprised of two rows of 4m and in the intercrop a maize row was interplanted between the plots. The diseases were recorded at flowering stage (R6) pod filling stage (R7) and pod ripening state (R8) on a scale of 1-9, where 1 = no disease and 9 = totally susceptible. The same experiment was repeated at Kachwekano (alt. 2300 m) but with an additional 15 bean genotypes included.

### Results and Discussion

The severity of the main diseases that developed on the beans in the trial at the two locations by the pod ripening stage are given in Table 1. At both locations the genotypes differed significantly ( $P \leq 0.05$ ) for all diseases recorded at the different growth stages under intercrop and in pure stand, but there was no significant genotype x cropping system interaction. The level of common bacterial blight and rust were almost all the time higher in pure stand than in the intercrop and the differences were significant at Bukalasa in 1988a and 1988b respectively. Angular leaf spot tended to be lower in pure stand than in the intercrop but the differences were small except in 1988b at Bukalasa where the difference was significant at the pod filling stage. As Phoma blight is only of importance in highland areas, it was only recorded at Kachwekano where it was more severe under intercropping than in the pure stand, though the differences were not significant. Anthracnose and halo blight occurred on the trial at Kachwekano but their severity and spread were low and showed no differences between the two cropping systems.

The low disease scores in the Table reflect relatively low disease pressure in particular during 1988a at Kachwekano but in other cases it is mainly because of resistance of some of the genotypes to the diseases. Most susceptible genotypes scored 7-8 on the 1-9 scale for angular leaf spot rust and common bacterial blight. The occurrence of lower levels of Cbb and rust under intercrop is in line with findings reported by other workers (Moreno, 1979; Van Rheeën *et al.* 1981). The lack of significant interaction between genotypes and cropping system suggests that selections for these diseases can justifiably be done in pure stand or the intercrop. However, since high disease pressure is desirable, selections for disease resistance against common blight and rust resistance would be best conducted in pure stand.

Table 1: Disease Scores in Pure Stand and Intercrop with maize at R8 at two locations in the 1st (a) and 2nd (b) Seasons of 1988.

Season	Cropping system	Kachwekano				Bukalasa		
		Als	Rust	Cbb	Pb	Als	Rust	Cbb
1988a	Pure	1.88	1.91	3.46	1.22	4.57	3.72	5.51
	Intercrop	1.95	1.55	3.28	1.30	4.64	3.57	4.95
	SE $\pm$	0.08	0.18	0.17	0.07	0.11	0.11	0.09
	% >/< /pure <sup>(1)</sup>	+3.72	-18.85	-5.20	+6.56	+1.53	-4.03	-10.16*(2)
1988b	Pure	3.70	2.30	2.64	2.94	4.05	2.93	5.24
	Intercrop	3.65	2.29	2.71	3.07	4.40	2.65	5.08
	SE $\pm$	0.05	0.06	0.17	0.11	0.18	0.07	0.07
	% >/< /pure	-1.35	-0.43	+2.58	+4.23	+8.64	-9.56*	-3.05

Als = Angular leaf spot; Cbb = Common bacterial blight; Pb = Phoma blight

(1) = % disease increase or decrease over pure stand.

(2) = Disease scores significant at  $P \geq 0.05$ .

## References

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